Technology: Microelectronics

University of Chicago Professor David Grier and Jennifer Curtis, former PhD student, now a researcher at the University of Heidelberg, Germany have measured the angular momentum carried by optical vortices, rings of light that rapidly spin microscopic spheres suspended in fluid around their circumference. This is an important step in harnessing their energy to power micro-electromechanical (MEMs) devices. Grier and Curtis have used dynamic holographic optical tweezers (HOT). Grier co-invented the HOT technology with a former Ph.D student. This uses forces exerted by strongly focused, computer-generated holograms to create large arrays of optical traps. Each trap can suspend a microscopic object motionlessly in three dimensions. HOT technology can transform the light forming ordinary optical traps into so-called helical modes. This changes the traps into optical vortices that can impart angular momentum to trapped objects, making them spin. All photons already carry an intrinsic angular momentum, but the added helical twist superimposes an additional orbital angular momentum onto the photons. This resembles the extra angular momentum acquired by an electron as it traces its orbit around the nucleus of an atom. "That's what makes these optical vortices and that's what makes them useful," Grier said. The research was supported by grants from Arryx Inc (the commercial licensee of HOT technology), the National Science Foundation and the W.M. Keck Foundation.

OMMIC wins ISO 90001:200 certifications for its GaAs MMIC and III-V epitaxy operations in Limeil, France. It also holds the ISO14001 certificate for good environmental practice at its facilities.

Automobile wireless standards

BMW, DaimlerChrysler, Ford, General Motors, Nissan, Toyota and Volkswagen have formed a The Vehicles Safety Communications project.

This aims at developing a set of international standards offering the same method of short-range communications to inform other cars about intend -ed movements.

The system will be based on the Dedicated Short Range Communications (DSRC) technology.

The range of this kind of communicatiowill be 200 to 300 meters. In the US a special radio frequency band at 5.9 GHz will be used. Equipment should be ready by early 2008.

InGaP HBT MMIC amplifiers

Hittite Microwave introduces a family of four InGaP HBT Gain Block MMIC amplifiers covering DC to 10.0 GHz. The amplifier die can be used as either cascadable 50 Ohm gain stages or to drive the LO of HMC mixers with up to +17dBm output power, making them an excellent choice for Microwave P2P/VSAT, test equipment, Military EW/ECM/C3I and space telecommunications applications.

Both the HMC395 and HMC405 offer 16 dB of gain with output IP3s of +30 dBm and +32dBm respectively. The HMC396 provides 12dB of gain, has output IP3 of +32 dBm, and covers applications in the DC to 8.0 GHz band. The HMC397, with 15dB of gain and output IP3 of +32 dBm, covers the DC to 10.0GHz market. All products require only 50 to 56mA from a +5V supply.

MEMS Industry Report 2003

Focus on Fabrication is the outcome of the MEMS Industry group surveying a significant segment of the MEMS industry and over 60 non-captive fabs worldwide in two broad categories - worldwide MEMS fabs and US MEMS companies outsourcing fabrication. In addition a group of industry leaders at the MEMS Technology Roadmap and Industry Congress at METRIC 2002 were asked to help identify the most critical fabrication issues. A key result of METRIC was a perception that MEMS will enable sensor pervasiveness. While markets are envisioned, they have to be created. Investment in these diverse structure is high and has delayed widespread adoption.

Device categories fall in the main into six categories: inertial sensors; optical mirrors, microfluid devices/microarrays; component for RF communications and inject nozzles.

The design of MEMS devices tends to focus on feasibility as opposed to manufacturability. This results in slow production ramp up, delaying creation of new markets.

Most fabs offer production expertise in nearly every major MEMS device category. The use of non-standard materials and processes required by diversity of MEMS concept is one of the major hindrances to faster production and manufacturing repeatability

On average fabs report they work at 30% capacity. Close to 40% of fabs anticipate increasing number of wafer processed, some significantly.

There is no consensus among MEMS fabs on the importance of design, process or materials standards.

Recent activity in Asia raises the question as to whether or not North America will remain the leading MEMS fabrication region.

Surveying US companies that outsource MEMS fabrication found the companies relatively satisfied with their fabs, though close to 50% felt that the overall quality of the fab service was a limiting factor in the development of their device, citing long turnaround and design issues as barriers.

Most companies spend the majority of product development time on fabrication and are not asking fabs to assist with design packaging or testing.

MEMS companies use customer and semi custom processes to fabricate devices though they prefer fabs that offer standard processes.

Companies are buying local and outsourcing fabrication to North American fabs.

Fab services are too broad. Process standardisation is still controversial. MEMS industry and semiconductor industry are different and at different stages of maturity.

Among the recommendations is the intention to work through organisations such as SEMI and NEXUS to drive consistent road maps and cost models for the MEMS industry and MEMS devices, as well as standardisation, manufacturability design, tracking MEMS time to market, re-use of fab processes and design tools.
Contact: http://www.memsindustrygroup.org/pdf/MIG_2003_Exec_Summary.pdf